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DIV. OF OIL, GAS & MINING

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Kennecott
Utah Copper

DERR
ENVIRONMENTAL RESPONSE & REMEDIATION
ENTERED
MAY - 7 2003
BY

May 5, 2003

Dr. Eva Hoffman
U.S. Environmental Protection Agency
999 18th Street, Suite 550
Denver, CO 80202-2466

Re: Responses to Comments on the KUCC Final Design for Remedial Action at South Facilities Groundwater

Dear Dr. Hoffman:

Thank you for coming to the Technical Review Committee (TRC) meeting last week. I thought it was an excellent opportunity for the group to see how the Joint Proposal fit together with the Remedial Design. As I indicated during the TRC, I am providing written responses to those who submitted written comments on the final remedial design. Listed below are your comments in italic font followed by our response in regular font. This letter, along with other response letters, will be packaged together and added to the Final Remedial Design as an addendum. Assuming the responses are satisfactory, I would request a letter from you formally approving the final remedial design.

I had the following questions as I read through the design report. I thought I understood the pathway that the acid water will take under normal and upset conditions, but I became confused on reading Figure 3-5, especially the acid flow portion. Is the flow in a canal above ground where the parts are not connected? Is the acid leachate flow included in the pipeline coming down past the RO plant? Are all the pipelines below ground?

You interpreted the drawing correctly. The acid-well water is currently routed through a buried pipe from the acid well to the lower, cement-lined canal. The water flows into the open, cement-lined canal and travels approximately 300 ft in the lined canal and then back into a pipe. This pipe carries the acid-well water in a buried and above ground pipeline to the Waste Water Disposal Pump Station. The acid-well water can be routed to the Bingham Reservoirs during upset conditions from the lower, cement-lined canal. The final configuration will not utilize the open canal for acid-plume water. Approximately 300 ft of double walled pipe with leak detection will be installed for this purpose. The design of this section of pipeline is currently underway.

The meteoric-leachate flow is in an above ground pipeline that passes near the RO plant. The pipeline can be routed into the open, fenced eastside reservoir near the RO plant or can bypass

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In M/035/002, 2003, Incoming
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the reservoir. From the reservoir, the flow is routed through a buried pipe to the P-Plant, Large Reservoir or the Waste Water Disposal Pump Station.

The pipeline shown adjacent to the RO plant is a pipeline that was installed to deliver small quantities of acid water to the building when nanofiltration technology was being testing at the site. This pipeline is no longer used to deliver acid plume water to the RO Plant.

Regarding p. 37, the 1st paragraph refers to other water purveyors. Are there other water purveyors who have approached Kennecott for water under this program?

This is primarily because of the distribution system that JVWCD has in place that will be used to get water to the public in the affected area. The NRD consent decree indicates that the treated water must go to a "system of a purveyor of municipal and industrial water." An agreement has been reached between KUCC and JVWCD for this to happen.

Regarding p. 39, 1st paragraph, the text indicates that the RO concentrate will be mixed with acid leach water to precipitate out calcium sulfate. I'm not sure why that happens. What extra ingredient does the acid leach water add to the mix?

The reason for this proposed step is to minimize future scale (as $CaSO_4.2H_2O$) in the Copperton tailing line. The RO concentrate has very high concentration of dissolved Ca (2,110 mg/L in the sample used in the mixing tests with Great Salt Lake water; Appendix C, Table 20a). In contrast, the median value from 1996 – 2000 for acid-plume water was 476 mg/L dissolved Ca (ECG1146; Appendix C, Table 1, p. 16). The acid-plume water, in contrast, contains 32,100 mg/L SO_4, compared to 6,090 mg/L in the RO concentrate. The result of mixing these two waters is to increase the supersaturation with respect to gypsum (by a factor of approximately 20 for a 1:1 mixture, i.e., 4x in [Ca] and 5x in SO_4]). Increasing the supersaturation increases the rate of gypsum precipitation (specifically in an irreversible system, which the flow-through process must be). As a matter of practical engineering, this would cause gypsum to precipitate predominantly in the reactor (where it can be managed relatively easily) rather than over a longer period in the pipeline, requiring more complicated and time-consuming sludge removal.

Regarding p. 50, 3rd paragraph, has a location for delivery of the water from the RO plant to JVWCD been chosen yet?

The Zone A metering station will be located along 10200 South adjacent to the northwest corner of the Cemetery Pond. KUCC will deliver treated water from the RO Plant to the Zone A metering station. From this station, the JVWCD will be responsible for transporting and storing the water for use in one of their reservoirs.

Regarding p. 50, 3rd paragraph, what happens to all the calcium sulfate in the Eastside Reservoir?

At this time, KUCC anticipates that the gypsum sludge in the Eastside reservoir generated by the addition of Zone A RO concentrate will be collected and transported to the tailings line for

disposal. Management of this sludge in a post-closure situation will be evaluated as part of the post-closure water management studies identified in the final remedial design.

Regarding Appendix A, page 13. Some of the sludges tested (in the old days) passed SPLP initially, but began to fail the test when allowed to age for a while. Were any aging experiments done? Were any mixing experiments done where the solid stability was subjected to abrasion?

Intuitively one would not expect leachate from SPLP or TCLP analysis of the subject sludges to exceed SPLP or TCLP criteria for one very simple reason. The acid plume water, prior to neutralization, does not exceed any of the leachability criteria. Adding mass in the form of lime to the water, dilutes the initial concentrations further (without taking account for the chemical neutralization reactions). Therefore, if the water did not exceed SPLP or TCLP criteria prior to lime addition, it is impossible for the leachate from the resulting sludge to exceed the same criteria.

Long-term aging tests of lime-treatment sludges from these waters have not yet been performed, but will be evaluated as part of the on-going testing for post-mining water treatment as described in the final remedial design report. However, SPLP testing of pipeline scale samples, which can be viewed as a sort of aged lime-treatment solid, do not indicate any elevated leachability under the SPLP protocol.

In addition to the comments you provided above, Mark Wichman from the USACE provided comments on the final remedial design via email. I responded to those comments via email and have attached a copy of those comments and responses to this letter. If you have any questions regarding these responses, please call me at 801-569-7128 or email at cherryj@kennecott.com.

Sincerely,

/Jon Cherry

Jon Cherry, P.E.
Senior Project Engineer

Attachment

Cc: Doug Bacon

Cherry, Jon (KUCC)

From: Cherry, Jon (KUCC)
Sent: Thursday, March 06, 2003 8:13 AM
To: 'Wichman, Mark D NWO'
Cc: 'Eva Hoffman (E-mail)'
Subject: RE: Final Design for Remedial Action at South Facilities Groundwater

Tracking:

Recipient	Delivery	Read
'Wichman, Mark D NWO'		
'Eva Hoffman (E-mail)'		
Vinton, Brian (KUCC)	Delivered: 3/6/2003 8:13 AM	Read: 3/6/2003 8:35 AM
Bayer, Helmar (KUCC-HBCI)	Delivered: 3/6/2003 8:13 AM	Read: 3/6/2003 9:44 AM
'Mark Logsdon (2) (E-mail)'		

Mark,

Thank you for your comments. Beneath each of your comments is some information to help answer your questions. If you need further information, please call or email.

Jon

-----Original Message-----
From: Wichman, Mark D NWO [mailto:Mark.D.Wichman@nwo02.usace.army.mil]
Sent: Wednesday, March 05, 2003 10:11 AM
To: Cherry, Jon (KUCC)
Subject: Final Design for Remedial Action at South Facilities Groundwater

Jon,

I've reviewed the subject document and offer the following general comments.

Paragraph 3.3.2. A stream factor of 85% is used as basis for the RO system design. Is this on-line percentage acceptable to the ultimate user, JVWCD? If this is to be a major source of water for the District, what redundancy needs to be included in the system to insure the reliability of the plant?
[Cherry, Jon (KUCC)] As you noticed in the design, the RO plant will consist of two separate skids that are each capable of treating 1500 gpm. Therefore, in most plant related shutdowns, the capacity of the plant will be reduced to 50%, as only one skid will be washed at a time. Only in shutdowns with external causes will both skids be off line at the same time. More importantly, the water produced from the Zone A RO Plant is only a small component of the overall water distribution system for the JVWCD. The permeate from Zone A will be mixed with other water from the JVWCD prior to distribution. Finally, JVWCD is aware of the stream factor design of 85% and is is planning accordingly.

Paragraph 3.3.3. "A portion of the permeate pipeline will be installed in a common trench with the feed water pipeline " Will this be acceptable to the State? Will the double containment piping meet the criteria for separation of drinking water piping from other non-potable water?
[Cherry, Jon (KUCC)] We will discuss the issue of feed water and permeate in a common trench with the State but don't anticipate problems because the regulations only specify a minimum distance of drinking water pipes from sewer pipes (ref. Utah DDW rule R309-550-7). In case both pipelines leaked at the same location at the same time, the feed water leaking from the feed pipe would have to overcome the pressure in the permeate pipe in order to contaminate the product water. Water will follow the path of least resistance and penetrate the soil rather then entering the

product water pipe while pipe is under pressure. .

Overall I agree with the approach utilized. Continuing to build upon the experience gained through the pilot plant as well as operating the RO system and working out the process issues prior to turning it over to JVWCD should produce a reliable final product.

Mark D. Wichman, P.E.
U.S. Army Corps of Engineers Omaha District
Engineering Division, Design Branch, Environmental Section
CENWO-ED-DK

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Data and Records Management Plan for the Kennecott South Facilities Groundwater Remedial Design

Prepared By: Kennecott Strategic Resources Group

Date: December 31, 2001
Version B

TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION AND PURPOSE

The Kennecott Utah Copper Corporation (KUCC) South Facilities Groundwater Remedial Design Work Plan (KUCC, 2001) calls for preparation of a plan for managing data and records generated during Remedial Design/Remedial Action (RD/RA) activities. The purpose of this Data and Records Management Plan (DRMP) is to describe the strategy and procedures for documenting, managing, storing, and transferring information generated as part of the RD/RA phase. It describes the types of data that are expected to be collected. It also discusses the software and procedures that will be used for loading, tracking, storing, retrieving, transferring, and archiving all analytical data collected during the Remedial Design (RD), and how reports, correspondence, and other information generated during the RD/RA will be managed and archived.

KUCC has in place a State-approved set of documents for collection, analysis, and record keeping of environmental samples that will be used as the basis for all water and environmental data collected during the RD. These documents are:

1) The Groundwater Characterization and Monitoring Plan (KUCC 2000) provides the objectives, general procedures, and reporting requirements for the ongoing groundwater monitoring at all KUCC facilities,
2) Standard Operating Procedures for Water Sampling (KUCC 1999a) describes in detail the procedures for collecting, submitting, and reporting water samples and quality-control samples and water-level measurements,
3) Quality Assurance Project Plan for the Ground Water Characterization and Monitoring Plan (KUCC 1999b) includes discussions of project organization and responsibilities, quality assurance objectives, sampling and analytical procedures, and guidelines for data verification and reporting, quality control checks, performance and systems audits, and corrective actions.

Many of the procedures typically included in a DRMP for a Superfund site are laid out in these documents and will not be restated here. For this reason, this DRMP will give particularly strong emphasis to RD/RA project-specific data needs.

2.0 TYPES OF DATA

The types of data currently expected to be collected during the RD/RA phase are:

- Ground-Water Elevation Data
- Flow and Pumping Records
- Groundwater Monitoring Analytical Data
- Tailing Geochemistry Analytical Data (aqueous and mineralogical phases)
- Pilot Treatment Effectiveness Analytical Data
- Quality Control Data from Field Activities/Audits
- Quality Control Data from Laboratory Analysis
- Drilling and Well Construction Information, including Lithologic and Geophysical Data

Procedures for collecting and documenting field data for water samples and water levels, drilling and logging data, and flow measurements, quality control requirements, and identifying new sample sites are all specified in the GCMP and associated documents (KUCC 2000, 1999a, 1999b) and are not repeated here.

3.0 DATA MANAGEMENT AND CONTROL

illustrates the flow, handling, and storage of RD data. The parties responsible for data collection, generation, use, and storage are shown on this drawing and discussed in section 3.1. Computer systems shown on are discussed in section 3.2.

3.1 DATA FLOW AND LABORATORY USE

KUCC Engineering Services (ES) operates a small laboratory located at the South Facilities Trailer Complex. The ES Lab will be used for process diagnostics on the alkali precipitation pilot plant, spot samples on Membrane Filtration Plant waters, and occasionally on other waters when quick turn-around time is needed. The ES lab maintains QC charts for all Atomic Absorption analytes (metals), and essentially follows SW-846 QA/QC procedures for these analytes. Records of non-standard methods (i.e. carbonate in alumina, settling tests, % moisture in filter cake) will be stored on-site for audit. The nature of the samples generated during pilot testing will warrant, at times, methodologies more stringent or orthogonal to methods used for environmental matrices (e.g. CLP, SW-846, or Standard Methods for WW). Therefore data from the ES Lab will be validated by the RD sub-project managers with an eye toward process development rather than strict compliance with RCRA environmental sample analysis protocols.

Solutions and solids collected as part of the Tailing Geochemistry Investigations will be submitted directly by qualified sampling personnel to Kennecott Environmental Laboratory (KEL), who will analyze all environmental samples when practical, except those mentioned above. Samples generated by the alkali precipitation pilot plant (a.k.a. treatment plant) in the validation phase of the treatment study will also be submitted to KEL, a State of Utah Certified Laboratory. Other certified commercial labs may be used if KEL does not have the capability or capacity to analyze for a specific parameter. Analytical data from KEL or other certified labs will be delivered in hardcopy and electronic format to the RD sub-project manager of the respective project after the analyses pass laboratory quality control. Once RD personnel have validated the data, it may be used to prepare reports, maps, tables, and graphics. Record keeping and data management for chemical analyses from this programs will accord with those for all other liquids and solids in the KUCC program.

In addition to samples of waters and tailing, discussed above, the Tailing Geochemistry investigations will include mineralogical evaluations of samples of both tailing and pipeline scale. The mineralogical evaluations will be performed by Dr. John Jambor (Leslie Consulting – R&D Division, Tsawassen, B.C., Canada) and/or Mr. Mark Logsdon (Geochimica, Inc., Ojai, CA) using the facilities of the University of British Columbia (Vancouver, B.C.) or University of Waterloo (Waterloo, Ontario). The mineralogical results are not well suited to computerized databases. Instead, hard copies of the mineralogical reports will be maintained in the hard-copy archive.

RD groundwater samples will be collected as per GCMP Standard Operating Procedures (KUCC 1999a) by a member of the KUCC Water Sampling Group. RD project personnel will communicate with this group to verify sample collection dates and status of analysis. The water samplers will log each sample into the GCMP Tracking System and submit the samples to KEL. The laboratory will be responsible for analysis and internal quality assurance/quality control (QA/QC) procedures. After analysis, groundwater sample results and quality control (QC) information will be submitted to the KUCC Water Sampling Group leader for acceptance and validation. KUCC water samplers will validate these data using the procedures identified in the QAPP (KUCC, 1999b). After data pass both laboratory and KUCC Water-Sampler quality control checks the RD quality control manager will verify it before inclusion in the RD database.

Water level information collected during well sampling will follow the same flow path as groundwater sampling and analytical information. Water levels collected for site-wide, short

time duration events will be entered into the Hydro-database, managed by Strategic Resources Group. These data will also be included in the RD/RA Water Information Database. Flow and pumping records and new-drilling information will be managed by Strategic Resources Group in the Hydro-database and/or the GSW database (see section 3.2). These data may be extracted from these databases for inclusion by RD project personnel in reports and other documents.

3.2 COMPUTER SYSTEMS FOR WATER DATA MANAGEMENT

Field geochemistry data associated with an RD water sample is stored in the GCMP Tracking and Field Data system administered by the KUCC water sampling team. Field data (pH, temperature, depth to water, etc.) are then merged with the analytical data by KEL into the Laboratory Information Management System (LIMS). This relational database is administrated by KEL and accessed using Structured Query Language (SQL). When KEL has verified the data as passing quality control, the KUCC water sampling team queries them from LIMS into the GCMP Database. Once the KUCC Water Sampling Group verifies the data, Kennecott Strategic Resources Group (SRG) will run Microsoft Visual FoxPro 6.0 and/or SQL queries to extract ground and surface water data, including the RD-specific data from LIMS and append it to the Ground and Surface Water Management System (GSW) database. The GSW program was developed by Kennecott in 1994 to house and access well-construction and location information and view and print analytical data time-series charts. This database, administrated by SRG, contains the full available historical record of aqueous chemistry data on KUCC monitoring wells. Any new well drilling and completion information will also be stored and accessed via the GSW program.

A Microsoft Excel- and Visual FoxPro-based database called the Hydro-database will house water level information from site-wide water level measurements not collected as part of water-quality sampling. Monitoring of well extraction rates and water levels are also stored in this database, which is administrated by SRG personnel. The water-chemistry data from the GSW system and the water-level information from the Excel spreadsheets will be combined using Microsoft Access and/or Visual FoxPro to create an RD/RA Water Information Database which can be used for analysis and evaluation of RD/RA sampling activities. Before inclusion in this database the data will be validated by the RD Quality Control Manager. Any data qualifiers resulting from the data validation will be added to the database.

Once the analytical data are entered in the database and are validated for quality assurance/quality control, Microsoft Access, Visual FoxPro, and/or Microsoft Excel will be

used to generate summary tables (hard copy and electronic copy) for monitoring reports. Both the hard copy and electronic copy of the summary tables and the hard copy of the original laboratory analytical reports will be included with monitoring reports submitted to the Technical Review Committee. The electronic summary tables will be submitted on either 3½-inch computer disk or compact disk, depending on file size.

Note that the computer network storage space allocated to these databases have various levels of user security. Only qualified project personnel will have the read and write capabilities on these databases. Select other SRG personnel involved with the RD/RA will have read-only access to the data. In this manner, the RD database will be useable and accessible, but cannot easily or mistakenly be changed.

4.0 DOCUMENT AND RECORDS CONTROL AND RETENTION

Documents generated during the RD/RA phase, including reports (draft and final versions), work plans, drawings, correspondence, analytical certificates and permits, will be managed and controlled by SRG personnel. This organizational program describes the management of both physical and electronic versions of the documents.

RD/RA project members producing or receiving RD/RA related documents will promptly submit the physical and electronic copies to the document control technician who will enter it into the system. A simple, consecutive numbering system will be used to cross-reference the physical copy with the electronic copy stored in the document control archive database. This unique identifier will consist of "RDRA" as a prefix followed by a consecutive number (e.g. 1, 2, 3 etc.). If the document is a subsequent version of a pre-existing document, a decimal number (e.g. .1) will be added to the unique identifier on the pre-existing document and filed with the previous version. The physical document will be filed in the Document Control Room at the South Facilities Trailer Complex after being labeled and logged into the database. The database application that will organize and store the electronic copies of the documents will be created using Lotus Notes, a document management and information sharing computer program. The archive application will be available to individuals with access to the KUCC computer network using an internet browser such as Microsoft Internet Explorer and security clearance to the documents. Any electronic documents that need to be transferred outside the network can be easily extracted from the Lotus Notes database and emailed or written to CD. If a document does not exist in electronic format, it will be either digitally scanned into electronic format or an abstract or simple description of the document

will be entered into the database with reference to the physical copy. This database will be backed up weekly to prevent permanent loss of data.

The GCMP explains how sampling related documents such as chain of custody forms, field data collection sheets, and water quality reports are filed. KUCC has other filing systems for documents such as invoices, receipts, construction orders, construction drawings, and laboratory documentation of quality control and analysis that will not be included in the RD/RA document control database described above.

KUCC will preserve, and will instruct their contractors and agents to preserve, all documents, records, and information of any kind relating to the performance of the remedial action. These physical documents will be kept by KUCC for a minimum of ten years after all RD/RA work is complete in accordance with 40 CFR Chapter I Part 300. Upon the conclusion of this document retention period, KUCC shall notify the United States at least ninety (90) days prior to the destruction of any such records, documents or information, and, upon request of the United States, KUCC shall deliver all such documents, records, and information to EPA.

5.0 REFERENCES

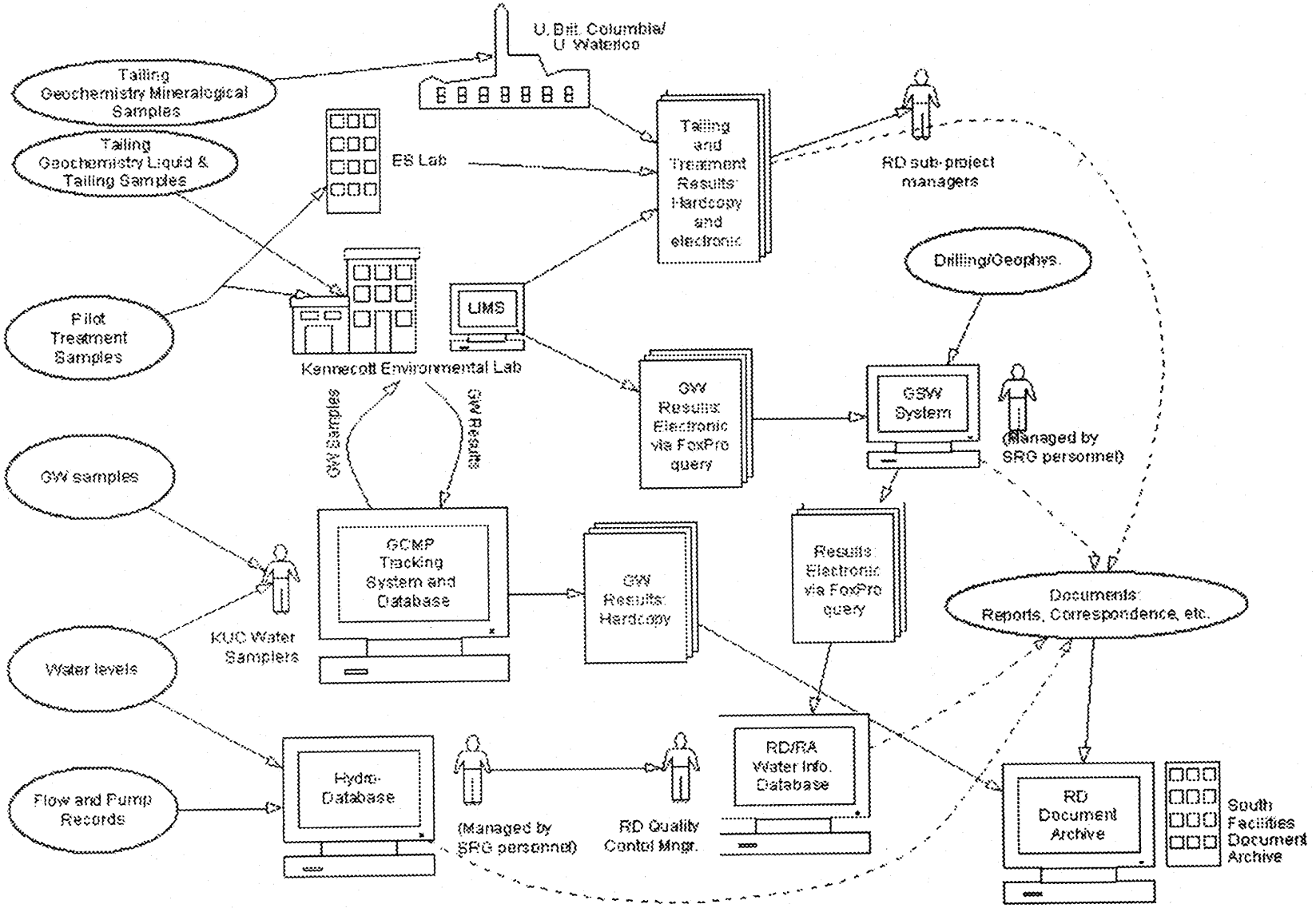
Kennecott Utah Copper Corporation, 1999a, Standard Operating Procedures for Water Sampling, Version 4, December, 309 p.

Kennecott Utah Copper Corporation, 1999b, Quality Assurance Project Plan for the Ground Water Characterization and Monitoring Plan, Revision 5, December, 29 p.

Kennecott Utah Copper Corporation, 2000, Ground Water Characterization and Monitoring Plan, revision 6, April, 91 p.

Kennecott Utah Copper Corporation, 2001. Final South Facilities Groundwater Remedial Design Work Plan. Version C, August 6, 2001. 44 p. plus attachments.

Figure 1. RD Data and Records Management Flowchart



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Kennecott
Utah Copper

May 5, 2003

DERR
ENVIRONMENTAL RESPONSE & REMEDIATION
ENTERED
MAY - 7 2003
BY

Mr. Doug Bacon
Utah Department of Environmental Quality
Department of Environmental Response and Remediation
168 North 1950 West
P.O. Box 144840
Salt Lake City, Utah 84114-4840

RE: KUCC Response to UDEQ Comments on the document entitled *Kennecott Utah Copper Corporation Final Design For Remedial Action at South Facilities Groundwater*, dated December 2002.

Dear Mr. Bacon,

Thank you for providing comments on the final remedial design referenced above. As I indicated during the Technical Review Committee (TRC) meeting, I am providing written responses to those who submitted written comments on the final remedial design. Listed below are your comments in italic font followed by our response in regular font. This letter, along with other response letters, will be packaged together and added to the final remedial design as an addendum. Assuming the responses are satisfactory, I would request a letter from you and the other State agencies formally approving the final remedial design.

DERR Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD)

General Comments on the RAFD:

(1) Tables 3-3 and 3-6 identify the sulfate standard as 1000 mg/l. Utah's primary drinking water standard for sulfate is 500 mg/l unless it can be demonstrated that better quality water is not available. Additionally, please note that the sulfate standard for a full rebate under the NRD CD is 250 mg/l and the TDS standard is 500 mg/l. Under the Primary Drinking Water standards for Utah, sodium and nickel need to be monitored and reported in accordance with the requirements of R309-104-4.1.3. Turbidity is not listed as part of the field analytical suite. Turbidity monitoring is required for ground water sources which provide water to community water systems.

Your comments regarding the primary MCL for sulfate and the requirement for a full NRD CD rebate at 250 mg/L sulfate are noted. Your comments regarding monitoring associated with drinking water systems are also noted. For clarification, the monitoring plan provided in the final remedial design is a groundwater monitoring plan. The drinking water system permit issued through the division of drinking water will specifically list all parameters that are required for monitoring of the proposed system.

(2) On page 71, Figure 4-1 Water Rights Management Plan provides a flow chart to demonstrate how water draw down issues will be managed between KUCC, the State Engineer, and the affected water right holder. A similar diagram was supposed to be included to demonstrate how water right holders (well users) would be assisted if their well water is affected by contaminants associated with both plumes. The State NRD Trustee (Director of UDEQ) or her designee was to be the point of contact during the assessment between KUCC and the affected party. Please describe and include a flow chart on how parties affected by the contamination from the two plumes will be assisted.

A revised flow chart describing water quality and quantity determinations and resolutions is attached to this letter.

Specific Comments on the RAFD:

(!) Page 15, Section 3.2.1 Acid Plume Containment and Extraction, 1st paragraph, 3rd and 6th sentences: It states that a second acid well will be installed approximately ¼ mile east of Highway 111 and adjacent to and south of the Trans Jordan Landfill in late 2002 or early 2003. It further states that the current extraction rate for ECG1146 (current acid well) is 900 gpm. Please explain if the new acid well (New Acid Well #1) has been installed and provide its current extraction rate. Pursuant to the meeting on March 31, 2003 both wells will be used to make up a combined extraction of acid plume water sufficient to meet the containment and reduction requirements. Please provide the pump rates for the new acid well and the amount of sulfate the system is projected to remove from the plume.

The new acid well, BSG1201, has been installed at the location described above and based upon the pump test results, it will be pumped at approximately 750 gpm. This new acid well will extract sulfate at a concentration of approximately 15,000 mg/L or approximately 24,600 tons per year.

(2) Page 15, Section 3.2.1 Acid Plume Containment and Extraction, 2nd paragraph, last sentence: It states, "Extraction rates and well field geometry will be set according to monitoring results to contain the acid plume, to extract Zone A sulfate waters for treatment to drinking water standards, to contain the 1500 mg/l sulfate plume on Kennecott property, and to balance the hydraulic response of the aquifer (draw down) with the need to protect the ability of the aquifer to transmit the acid water to the wells." Production of water should not impede KUCC's ability to contain the plume and protect the ability of the aquifer to transmit water.

KUCC plans to manage extractions from the aquifer in such a way as to accomplish all four main objectives listed below (all of these objectives have equal priority):

- contain and extract the acid plume,
- extract Zone A sulfate waters for treatment to drinking water standards,
- contain the 1500 mg/l sulfate plume on Kennecott property, and
- balance the hydraulic response of the aquifer (draw down) with the need to protect the ability of the aquifer to transmit the acid water to the wells

(3) Page 18, Section 3.2.1.2 Acid Plume Piping, 2nd paragraph, 1st and 4th sentences: It states that portions of the Precipitation Plant (P-plant) site and the evaporation ponds located on the Eastside Waste Rock dumps will be used to manage water directed from the project. The P-plant site is scheduled for demolition in approximately the next two years. Please explain what specific portion of this facility will be used to manage acid plume water and how the extended use of these structures will interact with the decommissioning and remediation of the remainder of the facility. Please explain if the proposed evaporation ponds are the same ponds or are in the same location as the current evaporation ponds proposed to receive cement kiln dust (CKD).

Those portions of the P-Plant that pump water and convey water will be left in tact. Specifically, pumps, pipelines and scavenger cells (used to remove copper from leach water) will remain in place. The proposed CKD reclamation project would occur in areas not related to the current evaporation ponds.

(4) Page 20, Section 3.2.2.3 Sulfate Well Construction, 1st paragraph, last sentence: Please state where make-up water for the Copperton Concentrator will come from once the three wells (LTG1147, B2G1193, and BFG1200) are converted for water delivery to the RO Plant.

Make-up water to replace the sulfate wells will come from other mine sources.

(5) Page 21, Section 3.2.3.2 Purpose, 2nd line item: Monitoring results should assure compliance with the 1500 mg/l containment standard listed in the EPA ROD and verify to the State Trustee that reduction of sulfate takes place each year.

As outlined in the final remedial design report, an annual monitoring report will be prepared and submitted that documents containment of sulfate at 1500 mg/L and total mass of sulfate removed from the aquifer.

(6) Page 24, Section 3.2.3.3. Procedures – Data Management, 1st paragraph, 2nd sentence: The Data and Records Management Plan discussed in this sentence has still not been provided to DERR. Please submit this management plan to DERR for our review.

Our records show that this document was provided to DERR in November 2001. Another copy is attached for your use.

(7) Page 32, Section 3.2.3.5 Water Chemistry – Monitoring Location, 1st paragraph, last sentence: No explanation is provided as to why monitoring around the clean water well (LTG1139) is necessary. Please explain why monitoring around well LTG1139 is necessary. Please list the processes that are provided water from the clean water well. This list will allow for an understanding of the importance of the monitoring activity.

Monitoring around LTG1139 is necessary to ascertain that this fine-grained aquifer is not over pumped. This well is used as necessary to provide make-up water to process, culinary water to the Lark area and culinary water to the Trans Jordan Landfill. Therefore, monitoring of water quality in the area is necessary.

(8) Page 40, Section 3.3.4.1 Process Description, 1st paragraph, 8th sentence: It states "Chlorine exposure is prevented now by administrative control." Please explain what administrative

controls are now in place that will keep the membranes from fouling by culinary water in the future.

Two controls have been implemented to prevent damage to the membranes from chlorinated water. First, piping changes have been made to prevent a reoccurrence of this event. The other control involves real time conductivity monitoring of the influent water. Only drinking water is chlorinated and drinking water has a significantly lower conductivity than the normal RO Plant feed water. Therefore, when lower than normal conductivity measurements are observed in the feed water it is assumed that chlorinated drinking water has entered the system and it is shut down before membrane damage can occur.

(9) Page 47, Figure 3-11 Zone "A" Reverse Osmosis Plant General Arrangement Site Plan: It appears that the existing acid well pipeline is directed to the northwest side of the existing membrane filtration building in the proposed design drawing. The pipeline for the acid well extraction system was supposed to be directed towards the KUCC tailings pipeline. Please explain why this line is directed to the side of the RO Plant building. Next to this intersection is another pipeline that is directed to a boxed structure and then into the existing membrane plant. Please explain the purpose of this pipeline.

The acid well pipeline located on the drawing is an existing pipeline that formerly provided a split stream of acid well water to the nanofiltration pilot plant. Remember that Phase 1 of the RO construction schedule is to retrofit the nanofiltration building and equipment with the first RO skid to treat up to 1500 gpm of sulfate water and all acid plume water will be routed to the tailings line.

(10) Page 51, Section 3.3.5.2 Process – Feed Water Blending, 1st paragraph, 5th sentence: It states, "Wells K60 and K109 (B2G1193 and BFG1200) are expected to increase in TDS over time as the acid plume moves towards these wells." The statement that these two wells, which are to act as a backup system for plume containment, will increase in TDS over time because of the potential migration of the acid plume is contradictory to the information provided to date about the performance of the extraction system. Please resolve this contradiction.

From the early 1990s through approximately 2000, wells K60 and K109 were experiencing an upward trend in sulfate concentrations. In approximately 2000, pumping rates were modified from various extractions points in the West Jordan well field and K60 and K109. These changes appear to have resulted in a leveling off of sulfate concentrations at K60 and K109 over the last two to three years. The statement in question should be interpreted that K60 and K109 have the potential to increase in sulfate concentration over time depending on aquifer extraction rates at K60, K109, the acid plume and the West Jordan well field.

(11) Page 70, Section 4.2.3 Division of Oil, Gas and Mining (DOGM) – Notice of Intent, 2nd paragraph, last sentence: It states, "Should the studies or sampling indicate any unanticipated negative consequences of the concentrate addition to the tailings circuit that would have an impact on final reclamation of the impoundment, KUCC will address the issues with DOGM." Because the use of the tailings impoundment is an integral component of the concentrate disposal system, both DERR and DWQ should also be contacted and involved in the reconciliation efforts.

Your comment is noted.

(12) Page 71, Figure 4-1 Water Rights Management Plan: Please label the decision point arrows from the box entitled "Are impacts caused by KUCC Remediation Program."

A revised flow chart describing water quality and quantity determinations and resolutions is attached to this letter (see response to general comment No. 2).

DERR Comments on the Preliminary Conceptual Post-Closure Water Management Plan for Kennecott Utah Copper Corporation – Appendix A of the KUCC RAFD -

Specific Comments:

(1) Page 20, Section 5.2.1.1 South Impoundment Considerations: Please explain how the use of the impoundment area interacts with the DOGM closure requirements for the South Tailings Impoundment area.

The south tailings impoundment is no longer part of active operations (mining or groundwater remediation) at KUCC and is currently undergoing final closure and reclamation. Closure of the south impoundment is proceeding according to conditions of the DOGM permit for that facility. Post-closure use of the south impoundment area for sludge storage and management is only one option being considered for long-term management of the sludge. If this site (or other sites within DOGM permit boundaries) is determined to be the preferred location of post-closure management of sludge, notification to and coordination with DOGM (and other DEQ agencies) will be made prior to any construction activities.

DERR Comments on the Baseline Groundwater Chemistry and Water Level Study Monitoring Report Second Quarter 2002 – Appendix D of the KUCC RAFD -

Specific Comments:

(1) Page 32, Section 5.2 Acid Plume, 2nd paragraph, last sentence: It states, "One area of the plume, located at the north-central edge has contracted approximately 1000 feet to the southwest, based on a slight rise in the pH of one well." Please explain how one well can be used to make the determination of reduction in a portion of the acid plume and how the model can make the assumption of the size of the area impacted.

Contouring and modeling of the plume is not based on any one point. Rather, the modeling and contouring of the plume are based on all available data points assembled together to show a representation of contaminant concentrations and contaminant migration and/or reduction. The text you have quoted above was qualified as indicated because of the apparent impact of the one well when the pH contours were redrawn. The data point in question, used in conjunction with other nearby data points, suggests that the north-central edge of the acid plume is contracting using standard contouring techniques. Whether it has contracted by 1000 feet or 800 feet is a matter of interpretation by the technical professional constructing the contour map. What is of more importance than a one-time data point used to create a contour map is the long-term monitoring and trends of the well.

(2) Page 34, Section 5.4 Acid and Sulfate Plume Migration, 4th paragraph: It states, "Ninety to ninety-five percent of the acidity in the acid plume is derived from the hydrolysis of Al^{3+} and Fe^{3+} ions in solution." It further states, "As the groundwater plume migrates down-gradient into zones of near neutral pH water, the dissolved Al undergoes a hydrolysis reaction that produces hydrogen ions, thereby decreasing the pH." As the acid plume dimensions change, please

explain if the rate of the hydrolysis reaction of Al is predictive of an increase in the dimensions of the plume.

The rate of the hydrolysis reaction is a chemically controlled matter that has nothing whatsoever to do with the advective flow rate. The hydrolysis itself is a homogeneous reaction (i.e., occurring in the aqueous phase only) and at the leading edge of the plume would occur very rapidly (because near pH 7, the dissolved Al^{3+} concentrations of the acid plume are far from equilibrium). The actual precipitation of solid $Al(OH)_3$ (versus the presence in solution of an aqueous complex $Al(OH)_3$ indicating that the hydrolysis has occurred) would be controlled by issues of nucleation rate for the solids, but this does not affect the alkalinity/acidity state of the plume. Therefore, the advance of the acid plume will be controlled virtually entirely by the advective flow of low-pH water downgradient. To the extent that the extraction program can control down-gradient flow of water (which is what an extraction system, necessarily, does), the low-pH zone will be controlled.

Please explain the operational feasibility of the extraction program in the core of the plume to stay in front of the production of acidity due to the hydrolysis reaction.

Each mole of Al (and Fe) removed decreases the long-term production of H^+ ions by 3 moles. The monitoring data clearly demonstrate that KUCC is rapidly removing Al from the "acid" plume (and elsewhere, too). As the Al plume contracts (faster than previously expected and modeled), the operational data demonstrate that the hydrogeochemical system is being controlled by the current pumping system. The additional pumping capacity of the second acid well will increase the efficiency of removing Al across the whole of the "acid" plume, and especially near its downgradient reach.

Division of Water Quality (DWQ) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD) -

1) While DWQ appreciates the interest in providing electronic copies for simplicity, in the future at least one hard copy of such submittals must be provided to DWQ for effective review and record retention.

Your comment is noted and one hard copy of each report will be provided to DWQ in the future.

2) Table 2-1 incorrectly lists e-mail addresses for State government employees. The State of Utah has changed to @utah.gov from the previous e-mail addresses. All State employee e-mail addresses should be checked and revised accordingly.

The list of TRC members has been updated to include current email addresses.

3) As has been stated in previous comments, DWQ believes that the primary focus of the project should be on acid plume withdrawal and containment of the acid plume to prevent further contaminant migration and aquifer degradation. The information in the final design document suggests that the primary goal of the project is to produce water for rebate against the Natural Resource Damage Claim. This approach risks pulling the acid plume to the outer containment wells at the KUC boundary and causing excessive drawdown. Table 3-1 shows a proposed extraction rate of 1,100 gpm for well LTG 1147. This well is in a less productive part of the aquifer and previous information suggests that the proposed pump rate is unsustainable. Further, the sulfate contamination in that part of the aquifer is less than what is proposed for the off-KUC property limit (1,500 mg/L). It is not clear what containment goal is being met for the large amount of drawdown that will be caused by pumping this well at such a high rate.

As we have stated in various meetings, KUCC plans to manage extractions from the aquifer in such a way as to accomplish all four main objectives listed below (all of these objective have equal priority):

- contain and extract the acid plume,
- extract Zone A sulfate waters for treatment to drinking water standards,
- contain the 1500 mg/l sulfate plume on Kennecott property, and
- balance the hydraulic response of the aquifer (draw down)

The extraction rate listed for well LTG1147 is the maximum that would be extracted from the well for blend water to the RO plant if needed. Based on recent data, this volume of water from LTG1147 may not be needed, if the sulfate concentrations at K60 and K109 remain at current levels or as indicated by monitoring over the last two or three years.

4) No withdrawal rate is provided for LTG 1139.

Well LTG1139 is currently used for culinary purposes at the Lark security building and as a backup water supply for parts of the Copperton concentrator. This well would be used as part of the remediation program as a backup supply for remineralization water at the RO plant if well LTG1147 is not available.

5) As an offset to possible excessive drawdown KUC has proposed re-injection. DWQ believes that re-injection has many positive possible affects. However, it is not clear that they will be achieved. DWQ has the following questions and comments regarding injection:

a) *Where will the water come from for injection?*
The specific source has not yet been determined. However, the injection water will come from a source(s) that has an approved drinking water source protection plan(s). It is possible that during the winter, excess water from the JVWCD may be used as an injection source. Other sources in the Oquirrhs are limited and will be evaluated further.

b) The injected water must be able to meet Federal Underground Injection Control (UIC) criteria.

Similar to injection permits received for the remediation program on the North End of KUCC property, a UIC permit for the South End would be obtained prior to injection or the substantive requirements of such a permit would be met.

c) Is re-injection the best use of the clean water?

The term re-injection only applies if the source of injection water is derived from groundwater. Since the source of injection water has not been determined at this time one cannot specifically respond to this comment. However, injection of clean water into aquifers is a becoming a common practice. The State Division of Water Rights even has a formal Aquifer Storage and Recovery program for this purpose. KUCC believes the injection of clean water between the sulfate plume and West Jordan's well field is best use of clean water because it would provide additional containment of existing contamination and help sustain the West Jordan well field as a viable culinary water supply for West Jordan.

d) How will KUC demonstrate effectiveness?

KUCC would demonstrate effectiveness by monitoring depth to water and water quality.

6) Where will KUC get water from to replace water currently used in operations from K60/109 once the project is in operation?

The replacement water for K60 and K109 will be obtained from sources within the mine in accordance with appropriate and valid water rights administered by the State Division of water rights.

7) DWQ appreciates the effort taken in getting appropriate background information prior to the beginning of this project.

Your comment is noted.

8) How will the 500 mg/L attenuation criteria be monitored and evaluated?

Attenuation of the 500 mg/L level will be monitored and evaluated as outlined in the Baseline Study report and monitoring program from the final remedial design.

9) DWQ believes that WJG 1170A, BFG 1200, B2G 1194 A and B, and B3G1197 A and B should be added to the group of wells monitoring the 1,500 mg/L containment.

Prior to receiving these comments, KUCC had already added these sites to the 2003 monitoring plan.

10) Figure 3-7 is confusing. It would be helpful if the figure were revised to show by color what the function of the well is, e.g. acid plume monitoring, 1,500 mg/L contour etc.

The function of each well is to obtain data not only about the acid plume or sulfate plume but also includes water levels and other chemistry to determine how the aquifer is behaving in general. Some wells are located outside of the plume to measure how the unaffected portions of the aquifer are behaving. A revised version of the monitoring location map will be provided in the next annual groundwater monitoring report to try and address some of these questions.

11) Table 3-4 does not explain all monitoring frequency symbols and does not agree with figure 3-7.

A revised table and map will be provided in the next annual groundwater monitoring report.

12) Wells should be sampled semi-annually, particularly at the beginning of the project. KUC may petition to have wells sampled less frequently on the basis of information obtained from the remediation project.

The proposed sampling frequency depends on the hydraulics of the system and the location of the wells relative to stresses on the system. Based on this, KUCC has included certain wells that monitored semi-annual and even more frequent basis.

The language regarding KUCC petitioning DWQ to reduce the sampling frequency on certain monitoring wells appears to be strangely similar to groundwater water discharge permit terms and conditions. Monitoring results for the remediation program will be reported annually to the TRC. Within the report, changes to the monitoring frequency will be detailed based on interpretation of collected data. From KUCC's perspective it is up to the EPA and TRC to collectively agree upon proposed monitoring frequencies.

13) The 1,500 mg/L and 500 mg/L wells should be regarded as compliance points. If the wells show an increase above the limit, then quarterly sampling should be initiated. If three successive sampling results are above the compliance limit then action must be taken by KUC to regain containment of the plume.

Again, the above comment appears to be permit based language that is not appropriate for this program. This is a very large and complex (in some instances perpetual) remediation program. Monitoring results will be reported to the TRC and discussed during semi-annual TRC meetings. If a corrective action is necessary to achieve the remedial goals based on the consensus of KUCC, EPA and the TRC, a plan will be developed and implemented with full input from all concerned entities.

14) DWQ is not comfortable with placing lime treatment sludge on the waste rock piles or in the Bingham or Melco pits as proposed in the document.

Your comment is noted. However KUCC is not proposing any specific location at this time. The report indicates that these locations are only a few of the many alternatives being evaluated for long term sludge management.

15) DWQ appreciates the focus on timely meetings and reports on the status of the remediation project. DWQ believes that the Groundwater Extraction should include totalizer values from all production wells in the affected area, including but not limited to LTG 1139, 1147, ECG 1146, K60/109and the West Jordan wells.

Totalizer values from the wells listed above will be reported as part of the annual monitoring report.

Division of Solid and Hazardous Waste (DSHW) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD)

1) Section 1.3 Description of Selected CERCLA Remedy: In this section, please outline potential RCRA permitting or compliance issues regarding permitting and compliance for treatment and storage. Please elaborate in this section or Section 4.0 of the work plan. Utah Hazardous Waste Rules (the Rules), R315-3-1 require permits for treatment, and storage of wastes defined as hazardous waste. R315-3-1 also provides for application for exclusions, exemptions, and permit-by-rule exemptions from the rules if they comply with the requirements of R315-3-6. The exclusions are allowed provided they also meet the definitions outlined by R315-2-4.

Extracted acid plume water does not exceed any hazardous characteristic levels for pH or metals. Therefore, when the acid plume water (pH ~3.5 or greater) is neutralized with lime, the resulting sludge also cannot exhibit hazardous characteristics as shown in Appendix A of the final remedial design report. On this basis, the Utah Hazardous Waste Rules (R315-3-1) do not apply to this project.

2) What groundwater withdrawal permits will be obtained to regulate the extraction and treatment of potential contaminated water?

All extracted groundwater will be in compliance with applicable and valid water rights approved by the State Engineer. The only other applicable permits related to withdrawal are well drilling permits issued by the State Division of Water Rights that KUCC obtains prior to drilling any well.

3) Section 3.2.3. Groundwater Monitoring, Section 3.2.3.2 Purpose: This section indicates several purposes for groundwater monitoring data. Will data also be used for making any hazardous waste determinations or declarations?

This data has already been used to make the determination that the groundwater is not characteristically hazardous.

4) Section 3.2.3.3. Procedures: Please identify waste disposition procedures or reference disposal options, SOPs etc. that will be used for this project. For example: What are the options for management of purge water from monitoring well extractions?

KUCC's Groundwater Characterization and Monitoring Plan (GCMP) is a plan submitted to and approved by DWQ that documents all of the sampling, analysis, QA/QC and SOPs required for various groundwater and UPDES discharge permits. The SOPs include procedures for the disposal of contaminated well water depending on the nature of the contaminant. All sampling related to the subject remediation program is done in accordance with the GCMP. For example, well casing purge water with a pH of <4.5 is

collected and placed into KUCC's process water circuit where it is neutralized and recydled.

5) Section 3.2.3.5 Water Chemistry - Analytical Suite: The last paragraph indicates that a state-certified lab will be used to analyze constituents of table 3-3. Some of the analytical methods listed on Table 3-3 are not the most current or approved method for a Utah certified laboratory. Please update Table 3-3 to reflect the most current and approved analytical methods and target detection limits required for a Utah Certified Laboratory in accordance with R444-14, Utah Department of Health, Utah Laboratory Improvement Division rules.

The methods listed in Table 3-3 were taken from the last version of the GCMP and represent the methods currently used by KUCC's EPA and State certified laboratory. However, to confirm the list of Analytical Methods, a copy of table 3-3 will be sent the laboratory director for confirmation. If changes in analytical methods are required, the changes will be reflected in the next version of the monitoring plan.

6) Section 4.0 Permits and Institutional Controls: There should be a discussion concerning RCRA permitting and compliance.

See response to comment No. 1 above.

Division of Water Rights (DWR) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD)

Comment:
In Table 1-1 under the failure mode "Extraction rate creates overdraft on aquifer" the adverse effect listed is "Rate of water-level decline exceeds State Engineer's guidelines."

Suggested Change:
Change the sentence in the adverse affect column to "Rate of water-level decline exceeds State Trustee's guidelines."

Reasoning:
The state engineer recognizes a pattern of declining water levels in the project area which occurred for several years preceding the time that pumping for this project was initiated and which continues to occur. The state engineer, therefore, would be inclined to reject any change application that would tend to significantly enlarge this problem. At the same time, however, he recognizes that it may be in the public's best interest to allow additional pumping in order for this project to be carried out and it is under that assumption that he has conditionally approved some of the initial change applications. The state engineer also recognizes that the final decision regarding the approval or rejection of this project along with any potential conditions or stipulations as well as the regulation concerning future compliance rests solely upon the authority of the State Trustee.

The guidelines to which KUCC is referring are those detailed in the State Groundwater Management Plan that includes guidelines for the KUCC groundwater remediation area. To our knowledge, the Trustee does not have any guidelines related to the rate of water level decline. This is exactly one of the reasons we continue to have TRC meetings such that these types of issues can be put on the table in front of representatives from the various agencies.

Comment:
Table 1-1 lists "adverse impacts to water rights" as a possible severe consequence. Possible mitigations listed are: 1) Monitor water levels against predictions and adjust pumping as necessary, 2) Respond to direction from State Engineer, and 3) Add injection wells to improve containment.

Suggested Change:
Change number two to "Provide just compensation to water right owners who are impaired as a result of the project."

Reasoning:
Numbers one and three may be appropriate actions if water rights are adversely impacted. However, the state engineer's authority for protecting existing water rights is primarily pre-emptive and generally extends only through the application process. He cannot compel one party to compensate another for impairment, nor can he compel any party to accept the terms of a proposed settlement. Once an application has gone through the application process the state engineer can only distribute groundwater by priority according to the applicable sections of Title 73 of the Utah Code. Under such a process the continuity of this remediation project cannot be guaranteed. The success of this project, therefore, is dependant upon Kennecott's commitment to the compensation of impaired water right owners. "Direction from [the] state engineer" will not necessarily be an effective mitigation.

Quantity and/or quality impacts to third party water right holders caused by KUCC will be addressed as outlined in the attached flow chart. This flow chart was reviewed and approved by the Trustee's representatives from DERR.

Comment:
Under 4.3 Groundwater Use Restrictions it says: "Restrictions on the use of water from existing wells, restrictions on the installation of new wells and a moratorium on new water rights within and adjacent to the project area will be established through the State Engineer and Department of Water Resources as needed."

Suggested Change:
Change entire sentence to: "Restrictions on the installation of new wells have been established through the state engineer and Division of Water Rights as outlined in the Salt Lake Valley Groundwater Management Plan."

Reasoning:
A letter to the state engineer from Jon Callendar of Kennecott dated August 16, 1999 reads in part:

> *Kennecott would like to propose a series of restrictions on future water well development in these areas. These restrictions would include:*
>
> *1. Completion depth and pumping rate restrictions on wells drilled within 3000 feet south of the known 250-mg/L-sulfate isoconcentration line in the Herriman area, as shown on Figure 4-4 of the RI.*
>
> *2. Completion depth and pumping rate restrictions on wells drilled within 3000 feet north of the known 250-mg/L-sulfate isoconcentration line in the West Jordan area, as shown on the same figure.*
>
> *3. Prohibition of new well development within the 250-mg/L-sulfate isoconcentration line in the former Kennecott evaporation pond area (South Jordan) until Kennecott installs its NRD remediation and water*

supply and treatment systems, achieves hydraulic containment of the upgradient groundwater plume, and the system reaches steady state and achieves a sulfate level in the area below 250 mg/L.

Appropriate completion depths and pumping rates would be determined on a case-by-case basis using the most up-to-date information on location and depth of contamination, aquifer properties, and user needs. Kennecott would supply this information to the State Engineer and any water user upon request. The restricted area will shrink as remediation and natural attenuation reduce the size of the contaminated zone.

Kennecott recognizes that these restrictions may adversely affect the water rights of private water users in these areas. Kennecott stands ready to assist affected property owners in obtaining an adequate water supply by identifying alternative water sources, providing technical assistance in siting and completing supply wells, and providing supplemental financing in cases where the presence of contamination causes an additional cost burden to the property owner.

The final Salt Lake Valley Groundwater Management Plan incorporates many of these proposed elements and contains the following text:

A portion of the aquifer in the Southwestern part of the valley is being remediated by the removal of contamination associated with past mining practices. As part of the remediation effort, Kennecott Utah Copper Corporation (KUCC) has committed to assist affected water users obtain adequate replacement water if adversely affected. Applications in this area which propose to change the point of diversion or drill a replacement well will be critically reviewed so as not to interfere with the remediation process. In conjunction with this, KUCC has committed to work with applicants to determine if there is a feasible well location, depth, and pumping rate for future wells in the contaminated area. The contaminated area is defined as extending 3000 feet from the known 250 mg/l sulfate isoconcentration contour.

KUCC agrees with your comment. The above letter along with a copy of the State Groundwater Management Plan were included as an Appendix to the KUCC/JVWCD Joint Proposal to the Utah State NRD Trustee and the USEPA Remedial Project Manager regarding the NRD components of the remediation program.

Comment:
Table 2-1 needs to be updated to reflect current email addresses.

Suggested Changes:
Change the email address for Jared Manning to jaredmanning@utah.gov and delete Chuck Williamson from the list of TRC members.

Division of Oil, Gas and Mining (DOGM) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD)

General Comment:

1) The identification, final closure, and reclamation of all facilities or impacts associated with this project have not been clearly identified. The organized identification of the hundreds of wells for sampling and removal of the acid and sulfate plumes, the location of the ultimate gypsum repository and the closure of any wells not being used or terminated must be identified so impacts and final deposition associated with these structures can be clearly assessed. This preliminary design plan does not look into the future regarding the ultimate closure nor does it provide real time decisions regarding the ultimate placement and reclamation of these treatment facilities.

The purpose of the final remedial design document was to provide the technical basis and design for the selected remedy outlined in the Record of Decision (ROD). The EPA and State Trustee for Natural Resources are administering this project both of which require financial guarantees. The State is guaranteed by an Irrevocable Letter of Credit that is currently valued at $45 million and escalates at 7 percent per year until the remediation facilities are constructed and operational. EPA, DOJ and KUCC are currently discussing financial guarantees related to CERCLA remediation issues. In previous correspondence with DOGM, it was indicated that if other agencies were administering the remediation program, including financial guarantees, that DOGM would not require the information or guarantees that are being requested.

a) *It is requested that all wells be grouped first by ownership and second by anticipated closure date*

This is not required under the ROD. Secondly, most if not all of the monitoring wells will be used into perpetuity and no closure dates are anticipated.

b) *A detailed explanation of the well closure protocol should be included in the plan regarding all wells identified as under Kennecott ownership under item #a.*

The State Department of Natural Resources has administrative rules that describe well abandonment procedures. These well abandonment procedures are found at R655-5-12 of the Utah Administrative Code (UAC). KUCC follows these procedures anytime a well is abandoned.

c) *The exact location and reclamation closure requirements for the Gypsum Repository is necessary to assess future reclamation impacts.*

See response to General Comment No.1 above.

d) *The monetary assurances necessary to carry out maintenance and reclamation of all operation structures with a finite life used to treat or facilitate this operation will need to be identified.*

See response to General Comment No.1 above.

Specific Comment:

1) *Page 51, Section 3.3.5.2 Process - Feed Water Blending, 3rd paragraph, 1st and 3rd sentences: It states, "The feed water tank provides a reservoir of water, which will be used to automatically purge concentrate from the membrane skids and flush the membranes in case of an automatic shutdown or a power outage." It further states, "The resulting flush water will be dumped into the trench inside the building, from where it can be discharged by sump pump to the Eastside Reservoir." DOGM notes that without power during a power outage some of the mechanical components of this plan may not work. Please explain if there is a secondary power supply or some other mechanical means to allow components (i.e., sump pump) of this system to work.*

The sump in question is of sufficient capacity to contain the purged concentrate during shutdown. After the power supply is restored, a sump pump will be activated to remove the water from the sump to the reservoir.

If you have any questions regarding KUCC's responses to your comments, please call me at 801-569-7128 or email at cherryj@kennecott.com.

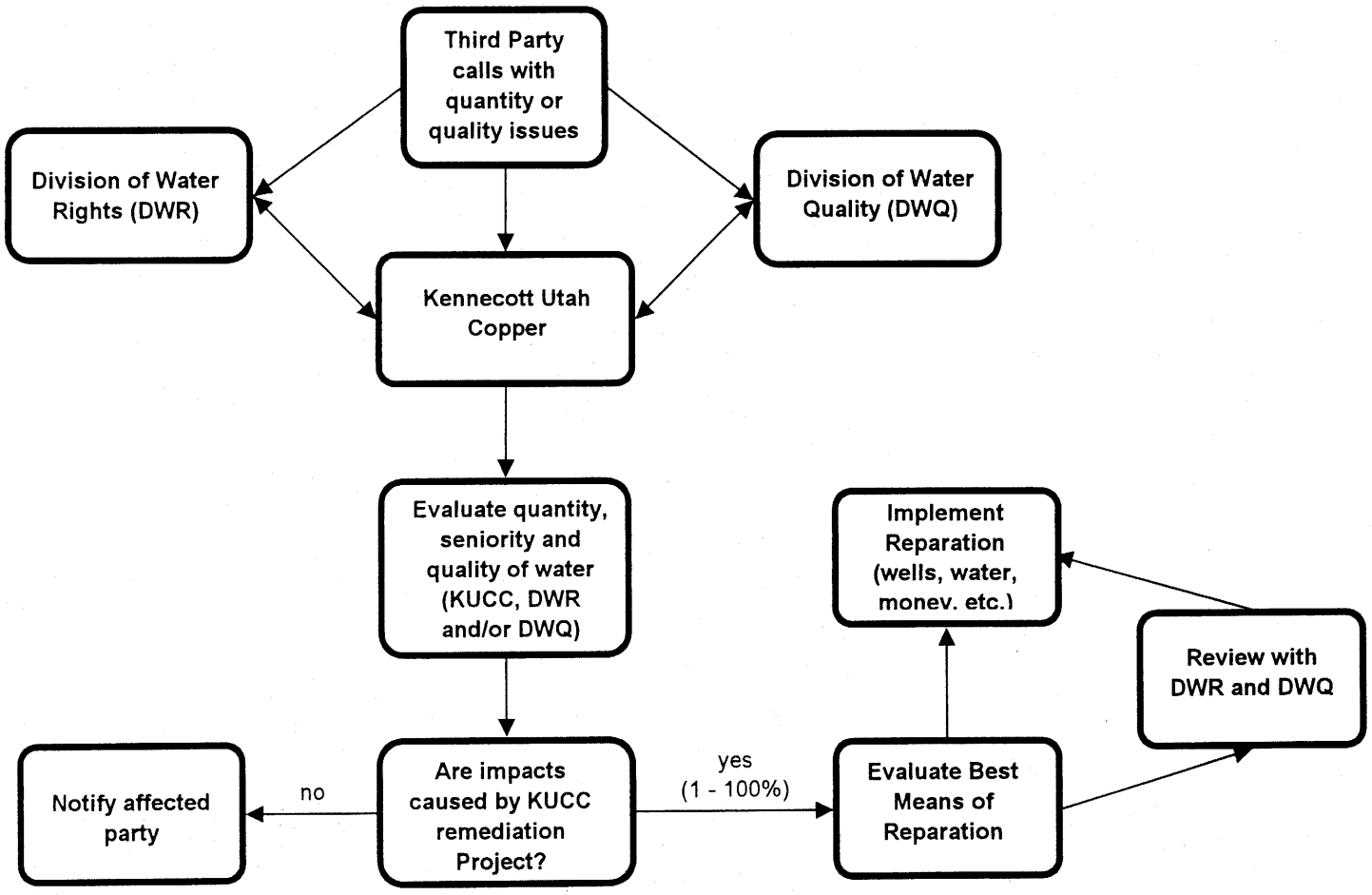
Sincerely,

Jon Cherry, P.E.
Senior Project Engineer

Attachments

Cc: Dr. Eva Hoffman – EPA Region VIII

KENNECOTT UTAH COPPER
WATER MITIGATION PLAN



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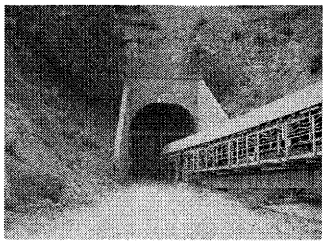

State Team Roundtable For Kennecott Projects

May 12, 2003
9:00 AM to 11:05 AM
(2 Hours, 5 Minutes)

Utah Department of Environmental Quality,
Division of Environmental Response and Remediation
168 North 1950 West - Building #2, 1st Floor, Room #101
Salt Lake City, Utah 840114

Meeting called by:	Doug Bacon, DERR Project Manager for KUCC South Zone CERCLA Activities
Type of meeting:	Project Discussions
Attendees:	DEQ – DERR, DDW, DAQ, DWQ, DSHW; DNR – DOGM, DWR, DWR
Please read:	A discussion of the time frame for the upcoming review of the NRD Project Proposal will take place. A discussion of the RD/RA activities on the Northend will be provided. A discussion of the individual historic facilities recently provided a conditional or final No Further Action status is proposed. A discussion of the recently submitted mine closure plan is proposed.

Agenda topics

5	Welcome	D. Bacon
30	KUCC Southend Activities	D. Bacon
30	KUCC Northend Activities	P. Greer
15	KUCC Historic Facilities	D. Bacon
15	Mine Closure	T. Munson
20	Team Discussion	Team Members
5	Request for Presentation by Team	D. Bacon
5	Closure and Action Items	D. Bacon

Special notes:	None at this time.

NRD DAMAGE PROPOSAL - J. CHERRY
4TH REVISION JUNE 2003 PUBLIC COMMENT PERIOD
PIANE - TWO AGREEMENT - TRUST FUND - REBATED
OVER LIFE OF PROJECT (40 YEARS?)

TOLLING AGREEMENT - ATTNORNEY G. - POSPONE
NRD CLAIM

40-50,000 GAL SPILL
SELENIUM - NRD - IMPACT TO WETLAND - FED. USFW

5 SHALLOW WELLS - SHERROW STEEL
850 S 15W (ALFALFA FROOENTS)
SHERROW STEEL
10 MILLION TAILING CAPPED IT 4 YEARS AGO
NORTH JORDAN RIVER
10 SHALLOW WELLS / YEARLY MONITORING

ESD - FILED WITH
TRENCH - SURFACE + SHALLOW

ZONE A

CERCLA - 5 YEAR REVIEW -

ALL REMOVED ← 3200 WEST - EAST PARTIALLY CLEANED UP
ARCO / ANACONDA TAILINGS CAP

TRANS JORDAN - LANDFILL
DITCH

Utah!
Where ideas connect
Department of Environmental Quality
Division of Environmental Response and Remediation

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
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Brad T Johnson
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ERRC-105-03

April 10, 2003

Mr. Jon Cherry, P.E.
Kennecott Utah Copper Corporation
8315 West 3595 South
P.O. Box 6001
Magna, Utah, 84044-6001

Re: Comments on the document entitled *Kennecott Utah Copper Corporation Final Design For Remedial Action at South Facilities Groundwater*, dated December 2002.

Dear Mr. Cherry,

The Utah Department of Environmental Quality (UDEQ) and the Department of Natural Resources (DNR) have received and reviewed the above referenced document. At this time UDEQ and DNR are providing comments to assist in the redrafting of the final design document.

To expedite delivery of the comments, the Division of Environmental Response and Remediation (DERR) has attached the comments from the Division of Water Quality (DWQ), the Division of Solid and Hazardous Waste (DSHW), the Division of Water Rights (DWR), and the Division of Oil, Gas and Mining (DOGM) to this letter. Please direct your attention to the enclosures.

Although there may be concerns/issues relative to NRD proposal integration with the CERCLA action, the enclosed comments are directed only at technical components of the CERCLA action. If after a review of the NRD proposal and NRD project agreements our concerns are still pertinent the DERR will provide additional comments for consideration. Although many of UDEQ's comments were discussed verbally on March 31, 2003, they are provided here for the record.

If you have any questions, feel free to call me at (801) 536 – 4282.

Sincerely,

Douglas C. Bacon, Project Manager
Division of Environmental Response and Remediation

DCB/jdp

Enclosure (s)

cc: Brad T Johnson, Acting Director, Division of Environmental Response and Remediation
Dr. Eva Hoffman, United States Environmental Protection Agency, Region VIII
Daniel Hall, Environmental Scientist, Division of Water Quality
David Mccleary, Environmental Scientist, Division of Solid and Hazardous Waste
Jared Manning, Environmental Scientist, Division of Water Rights
Tom Munson, Environmental Scientist, Division of Oil, Gas and Mining
Patti Pavey, M.S., Director, Salt Lake Valley Health Department

M/035/002
NRDC

DERR Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD) -

General Comments on the RAFD:

(1) Tables 3-3 and 3-6 identify the sulfate standard as 1000 mg/l. Utah's primary drinking water standard for sulfate is 500 mg/l unless it can be demonstrated that better quality water is not available. Additionally, please note that the sulfate standard for a full rebate under the NRD CD is 250 mg/l and the TDS standard is 500 mg/l. Under the Primary Drinking Water standards for Utah, sodium and nickel need to be monitored and reported in accordance with the requirements of R309-104-4.1.3. Turbidity is not listed as part of the field analytical suite. Turbidity monitoring is required for ground water sources which provide water to community water systems.

(2) On page 71, Figure 4-1 Water Rights Management Plan provides a flow chart to demonstrate how water draw down issues will be managed between KUCC, the State Engineer, and the affected water right holder. A similar diagram was supposed to be included to demonstrate how water right holders (well users) would be assisted if their well water is affected by contaminants associated with both plumes. The State NRD Trustee (Director of UDEQ) or her designee was to be the point of contact during the assessment between KUCC and the affected party. Please describe and include a flow chart on how parties affected by the contamination from the two plumes will be assisted.

Specific Comments on the RAFD:

(1) Page 15, Section 3.2.1 Acid Plume Containment and Extraction, 1st paragraph, 3rd and 6th sentences: It states that a second acid well will be installed approximately ¼ mile east of Highway 111 and adjacent to and south of the Trans Jordan Landfill in late 2002 or early 2003. It further states that the current extraction rate for ECG1146 (current acid well) is 900 gpm. Please explain if the new acid well (New Acid Well #1) has been installed and provide its current extraction rate. Pursuant to the meeting on March 31, 2003 both wells will be used to make up a combined extraction of acid plume water sufficient to meet the containment and reduction requirements. Please provide the pump rates for the new acid well and the amount of sulfate the system is projected to remove from the plume.

(2) Page 15, Section 3.2.1 Acid Plume Containment and Extraction, 2nd paragraph, last sentence: It states, "Extraction rates and well field geometry will be set according to monitoring results to contain the acid plume, to extract Zone A sulfate waters for treatment to drinking water standards, to contain the 1500 mg/l sulfate plume on Kennecott property, and to balance the hydraulic response of the aquifer (draw down) with the need to protect the ability of the aquifer to transmit the acid water to the wells." Production of water should not impede KUCC's ability to contain the plume and protect the ability of the aquifer to transmit water.

(3) Page 18, Section 3.2.1.2 Acid Plume Piping, 2nd paragraph, 1st and 4th sentences: It states that portions of the Precipitation Plant (P-plant) site and the evaporation ponds located on the Eastside Waste Rock dumps will be used to manage water directed from the project. The P-plant site is scheduled for demolition in approximately the next two years. Please explain what specific portion of this facility will be used to manage acid plume water and how the extended

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use of these structures will interact with the decommissioning and remediation of the remainder of the facility. Please explain if the proposed evaporation ponds are the same ponds or are in the same location as the current evaporation ponds proposed to receive cement kiln dust (CKD).

(4) Page 20, Section 3.2.2.3 Sulfate Well Construction, 1st paragraph, last sentence: Please state where make-up water for the Copperton Concentrator will come from once the three wells (LTG1147, B2G1193, and BFG1200) are converted for water delivery to the RO Plant.

(5) Page 21, Section 3.2.3.2 Purpose, 2nd line item: Monitoring results should assure compliance with the 1500 mg/l containment standard listed in the EPA ROD and verify to the State Trustee that reduction of sulfate takes place each year.

(6) Page 24, Section 3.2.3.3. Procedures – Data Management, 1st paragraph, 2nd sentence: The Data and Records Management Plan discussed in this sentence has still not been provided to DERR. Please submit this management plan to DERR for our review.

(7) Page 32, Section 3.2.3.5 Water Chemistry – Monitoring Location, 1st paragraph, last sentence: No explanation is provided as to why monitoring around the clean water well (LTG1139) is necessary. Please explain why monitoring around well LTG1139 is necessary. Please list the processes that are provided water from the clean water well. This list will allow for an understanding of the importance of the monitoring activity.

(8) Page 40, Section 3.3.4.1 Process Description, 1st paragraph, 8th sentence: It states "Chlorine exposure is prevented now by administrative control." Please explain what administrative controls are now in place that will keep the membranes from fouling by culinary water in the future.

(9) Page 47, Figure 3-11 Zone "A" Reverse Osmosis Plant General Arrangement Site Plan: It appears that the existing acid well pipeline is directed to the northwest side of the existing membrane filtration building in the proposed design drawing. The pipeline for the acid well extraction system was supposed to be directed towards the KUCC tailings pipeline. Please explain why this line is directed to the side of the RO Plant building. Next to this intersection is another pipeline that is directed to a boxed structure and then into the existing membrane plant. Please explain the purpose of this pipeline.

(10) Page 51, Section 3.3.5.2 Process – Feed Water Blending, 1st paragraph, 5th sentence: It states, "Wells K60 and K109 (B2G1193 and BFG1200) are expected to increase in TDS over time as the acid plume moves towards these wells." The statement that these two wells, which are to act as a backup system for plume containment, will increase in TDS over time because of the potential migration of the acid plume is contradictory to the information provided to date about the performance of the extraction system. Please resolve this contradiction.

(11) Page 70, Section 4.2.3 Division of Oil, Gas and Mining (DOGM) – Notice of Intent, 2nd paragraph, last sentence: It states, "Should the studies or sampling indicate any unanticipated negative consequences of the concentrate addition to the tailings circuit that would have an impact on final reclamation of the impoundment, KUCC will address the issues with DOGM."

Because the use of the tailings impoundment is an integral component of the concentrate disposal system, both DERR and DWQ should also be contacted and involved in the reconciliation efforts.

(12) Page 71, Figure 4-1 Water Rights Management Plan: Please label the decision point arrows from the box entitled "Are impacts caused by KUCC Remediation Program."

DERR Comments on the *Preliminary Conceptual Post-Closure Water Management Plan for Kennecott Utah Copper Corporation* – Appendix A of the KUCC RAFD -

Specific Comments:

(1) Page 20, Section 5.2.1.1 South Impoundment Considerations: Please explain how the use of the impoundment area interacts with the DOGM closure requirements for the South Tailings Impoundment area.

DERR Comments on the *Baseline Groundwater Chemistry and Water Level Study Monitoring Report Second Quarter 2002* – Appendix D of the KUCC RAFD -

Specific Comments:

(1) Page 32, Section 5.2 Acid Plume, 2nd paragraph, last sentence: It states, "One area of the plume, located at the north-central edge has contracted approximately 1000 feet to the southwest, based on a slight rise in the pH of one well." Please explain how one well can be used to make the determination of reduction in a portion of the acid plume and how the model can make the assumption of the size of the area impacted.

(2) Page 34, Section 5.4 Acid and Sulfate Plume Migration, 4th paragraph: It states, "Ninety to ninety-five percent of the acidity in the acid plume is derived from the hydrolysis of Al^{3+} and Fe^{3+} ions in solution." It further states, "As the groundwater plume migrates down-gradient into zones of near neutral pH water, the dissolved Al undergoes a hydrolysis reaction that produces hydrogen ions, thereby decreasing the pH." As the acid plume dimensions change, please explain if the rate of the hydrolysis reaction of Al is predictive of an increase in the dimensions of the plume. Please explain the operational feasibility of the extraction program in the core of the plume to stay in front of the production of acidity due to the hydrolysis reaction.

Division of Water Quality (DWQ) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD) -

The Division of Water Quality (DWQ) has received and reviewed the KUC South Facilities Groundwater Remedial Action Final Design submittal. The Division provides the following comments on the proposed design.

1) While DWQ appreciates the interest in providing electronic copies for simplicity, in the future at least one hard copy of such submittals must be provided to DWQ for effective review and record retention.

2) Table 2-1 incorrectly lists e-mail addresses for State government employees. The State of Utah has changed to @utah.gov from the previous e-mail addresses. All State employee e-mail addresses should be checked and revised accordingly.

3) As has been stated in previous comments, DWQ believes that the primary focus of the project should be on acid plume withdrawal and containment of the acid plume to prevent further contaminant migration and aquifer degradation. The information in the final design document suggests that the primary goal of the project is to produce water for rebate against the Natural Resource Damage Claim. This approach risks pulling the acid plume to the outer containment wells at the KUC boundary and causing excessive drawdown. Table 3-1 shows a proposed extraction rate of 1,100 gpm for well LTG 1147. This well is in a less productive part of the aquifer and previous information suggests that the proposed pump rate is unsustainable. Further, the sulfate contamination in that part of the aquifer is less than what is proposed for the off-KUC property limit (1,500 mg/L). It is not clear what containment goal is being met for the large amount of drawdown that will be caused by pumping this well at such a high rate.

4) No withdrawal rate is provided for LTG 1139.

5) As an offset to possible excessive drawdown KUC has proposed re-injection. DWQ believes that re-injection has many positive possible affects. However, it is not clear that they will be achieved. DWQ has the following questions and comments regarding injection:

a) Where will the water come from for injection?

b) The injected water must be able to meet Federal Underground Injection Control (UIC) criteria.

c) Is re-injection the best use of the clean water?

d) How will KUC demonstrate effectiveness?

6) Where will KUC get water from to replace water currently used in operations from K60/109 once the project is in operation?

7) DWQ appreciates the effort taken in getting appropriate background information prior to the beginning of this project.

8) How will the 500 mg/L attenuation criteria be monitored and evaluated?

9) DWQ believes that WJG 1170A, BFG 1200, B2G 1194 A and B, and B3G1197 A and B should be added to the group of wells monitoring the 1,500 mg/L containment.

10) Figure 3-7 is confusing. It would be helpful if the figure were revised to show by color what the function of the well is, e.g. acid plume monitoring, 1,500 mg/L contour etc.

11) Table 3-4 does not explain all monitoring frequency symbols and does not agree with figure 3-7.

12) Wells should be sampled semi-annually, particularly at the beginning of the project. KUC may petition to have wells sampled less frequently on the basis of information obtained from the remediation project.

13) The 1,500 mg/L and 500 mg/L wells should be regarded as compliance points. If the wells show an increase above the limit, then quarterly sampling should be initiated. If three successive sampling results are above the compliance limit then action must be taken by KUC to regain containment of the plume.

14) DWQ is not comfortable with placing lime treatment sludge on the waste rock piles or in the Bingham or Melco pits as proposed in the document.

15) DWQ appreciates the focus on timely meetings and reports on the status of the remediation project. DWQ believes that the Groundwater Extraction should include totalizer values form all production wells in the affected area, including but not limited to LTG 1139, 1147, ECG 1146, K60/109and the West Jordan wells.

Division of Solid and Hazardous Waste (DSHW) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD) -

1) Section 1.3 Description of Selected CERCLA Remedy: In this section, please outline potential RCRA permitting or compliance issues regarding permitting and compliance for treatment and storage. Please elaborate in this section or Section 4.0 of the work plan. Utah Hazardous Waste Rules (the Rules), R315-3-1 require permits for treatment, and storage of wastes defined as hazardous waste. R315-3-1 also provides for application for exclusions, exemptions, and permit-by-rule exemptions from the rules if they comply with the requirements of R315-3-6. The exclusions are allowed provided they also meet the definitions outlined by R315-2-4.

2) What groundwater withdrawal permits will be obtained to regulate the extraction and treatment of potential contaminated water?

3) Section 3.2.3. Groundwater Monitoring, Section 3.2.3.2 Purpose: This section indicates several purposes for groundwater monitoring data. Will data also be used for making any hazardous waste determinations or declarations?

4) Section 3.2.3.3. Procedures: Please identify waste disposition procedures or reference disposal options, SOPs etc. that will be used for this project. For example: What are the options for management of purge water from monitoring well extractions?

5) Section 3.2.3.5 Water Chemistry - Analytical Suite: The last paragraph indicates that a state-certified lab will be used to analyze constituents of table 3-3. Some of the analytical methods listed on Table 3-3 are not the most current or approved method for a Utah certified laboratory. Please update Table 3-3 to reflect the most current and approved analytical methods and target detection limits required for a Utah Certified Laboratory in accordance with R444-14, Utah Department of Health, Utah Laboratory Improvement Division rules.

6) Section 4.0 Permits and Institutional Controls: There should be a discussion concerning RCRA permitting and compliance.

Division of Water Rights (DWR) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD) -

Comment:
In Table 1-1 under the failure mode "Extraction rate creates overdraft on aquifer" the *adverse effect* listed is "Rate of water-level decline exceeds State Engineer's guidelines."

Suggested Change:
Change the sentence in the adverse affect column to "Rate of water-level decline exceeds State Trustee's guidelines."

Reasoning:
The state engineer recognizes a pattern of declining water levels in the project area which occurred for several years preceding the time that pumping for this project was initiated and which continues to occur. The state engineer, therefore, would be inclined to reject any change application that would tend to significantly enlarge this problem. At the same time, however, he recognizes that it may be in the public's best interest to allow additional pumping in order for this project to be carried out and it is under that assumption that he has conditionally approved some of the initial change applications. The state engineer also recognizes that the final decision regarding the approval or rejection of this project along with any potential conditions or stipulations as well as the regulation concerning future compliance rests solely upon the authority of the State Trustee.

Comment:
Table 1-1 lists "adverse impacts to water rights" as a possible severe consequence. Possible mitigations listed are: 1) Monitor water levels against predictions and adjust pumping as necessary, 2) Respond to direction from State Engineer, and 3) Add injection wells to improve containment.

Suggested Change:
Change number two to "Provide just compensation to water right owners who are impaired as a result of the project."

Reasoning:
Numbers one and three may be appropriate actions if water rights are adversely impacted. However, the state engineer's authority for protecting existing water rights is primarily pre-emptive and generally extends only through the application process. He cannot compel one party to compensate another for impairment, nor can he compel any party to accept the terms of a proposed settlement. Once an application has gone through the application process the state engineer can only distribute groundwater by priority according to the applicable sections of Title 73 of the Utah Code. Under such a process the continuity of this remediation project cannot be guaranteed. The success of this project, therefore, is dependant upon Kennecott's commitment to the compensation of impaired water right owners. "Direction from [the] state engineer" will not necessarily be an effective mitigation.

Comment:
Under 4.3 Groundwater Use Restrictions it says: "Restrictions on the use of water from existing wells, restrictions on the installation of new wells and a moratorium on new water rights within and adjacent to the project area will be established through the State Engineer and Department of Water Resources as needed."

Suggested Change:
Change entire sentence to: "Restrictions on the installation of new wells have been established through the state engineer and Division of Water Rights as outlined in the Salt Lake Valley Groundwater Management Plan."

Reasoning:
A letter to the state engineer from Jon Callendar of Kennecott dated August 16, 1999 reads in part:

> Kennecott would like to propose a series of restrictions on future water well development in these areas. These restrictions would include:
>
> 1. Completion depth and pumping rate restrictions on wells drilled within 3000 feet south of the known 250-mg/L-sulfate isoconcentration line in the Herriman area, as shown on Figure 4-4 of the RI.
>
> 2. Completion depth and pumping rate restrictions on wells drilled within 3000 feet north of the known 250-mg/L-sulfate isoconcentration line in the West Jordan area, as shown on the same figure.
>
> 3. Prohibition of new well development within the 250-mg/L-sulfate isoconcentration line in the former Kennecott evaporation pond area (South Jordan) until Kennecott installs its NRD remediation and water supply and treatment systems, achieves hydraulic containment of the upgradient groundwater plume, and the system reaches steady state and achieves a sulfate level in the area below 250 mg/L.
>
> Appropriate completion depths and pumping rates would be determined on a case-by-case basis using the most up-to-date information on location and depth of contamination, aquifer properties, and user needs. Kennecott would supply this information to the State Engineer and any water user upon request. The restricted area will shrink as remediation and natural attenuation reduce the size of the contaminated zone.
>
> Kennecott recognizes that these restrictions may adversely affect the water rights of private water users in these areas. Kennecott stands ready to assist affected property owners in obtaining an adequate water supply by identifying alternative water sources, providing technical assistance in siting and completing supply wells, and providing supplemental financing in cases where the presence of contamination causes an additional cost burden to the property owner.

The final Salt Lake Valley Groundwater Management Plan incorporates many of these proposed elements and contains the following text:

> A portion of the aquifer in the Southwestern part of the valley is being remediated by the removal of contamination associated with past mining practices. As part of the remediation effort, Kennecott Utah Copper Corporation (KUCC) has committed to assist affected water users obtain adequate replacement water if adversely affected. Applications in this area which propose to change the point of diversion or drill a replacement well will be critically reviewed so as not to interfere with the remediation process. In conjunction with

this, KUCC has committed to work with applicants to determine if there is a feasible well location, depth, and pumping rate for future wells in the contaminated area. The contaminated area is defined as extending 3000 feet from the known 250 mg/l sulfate isoconcentration contour.

Comment:
Table 2-1 needs to be updated to reflect current email addresses.

Suggested Changes:
Change the email address for Jared Manning to jaredmanning@utah.gov and delete Chuck Williamson from the list of TRC members.

Division of Oil, Gas and Mining (DOGM) Comments on the Kennecott Utah Copper Corporation (KUCC) Final Design For Remedial Action at South Facilities Groundwater (RAFD) -

General Comment:

1) The identification, final closure, and reclamation of all facilities or impacts associated with this project have not been clearly identified. The organized identification of the hundreds of wells for sampling and removal of the acid and sulfate plumes, the location of the ultimate gypsum repository and the closure of any wells not being used or terminated must be identified so impacts and final deposition associated with these structures can be clearly assessed. This preliminary design plan does not look into the future regarding the ultimate closure nor does it provide real time decisions regarding the ultimate placement and reclamation of these treatment facilities.

a) It is requested that all wells be grouped first by ownership and second by anticipated closure date.

b) A detailed explanation of the well closure protocol should be included in the plan regarding all wells identified as under Kennecott ownership under item #a.

c) The exact location and reclamation closure requirements for the Gypsum Repository is necessary to assess future reclamation impacts.

d) The monetary assurances necessary to carry out maintenance and reclamation of all operation structures with a finite life used to treat or facilitate this operation will need to be identified.

Specific Comment:

1) Page 51, Section 3.3.5.2 Process - Feed Water Blending, 3rd paragraph, 1st and 3rd sentences: It states, "The feed water tank provides a reservoir of water, which will be used to automatically purge concentrate from the membrane skids and flush the membranes in case of an automatic shutdown or a power outage." It further states, "The resulting flush water will be dumped into the trench inside the building, from where it can be discharged by sump pump to the Eastside Reservoir." DOGM notes that without power during a power outage some of the mechanical components of this plan may not work. Please explain if there is a secondary power supply or some other mechanical means to allow components (i.e., sump pump) of this system to work.

COMMENTS EMAILED TO DOUG BACON 3/4/03
WAYNE O.K'D ON 3/4/03

M/35/002 - NRDC

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m/035/002 - NRD

Kennecott Utah Copper Corporation
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Magna, Utah 84044-6001
(801) 252-3000

November 15, 2002

Kennecott

Wayne Hedberg
Utah Div. Oil Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

Dear Mr. Hedberg:

RE: Update to Kennecott's Resource Roundtable in November 2000

In an effort to keep the community involved in the ongoing activities at Kennecott Utah Copper, this letter is being sent to provide you with follow up information to the Roundtable discussions held in November 2000 at Saltair Resort. We want to thank you again for your participation.

Kennecott has completed its remediation activities in the Garfield Wetland area. Approximately 1,986,000 tons of contaminated soil and sediment were removed from the wetlands and put into a state of the art, triple lined repository that incorporates leak detection systems and ground water monitoring. Contaminated artesian waters are being captured and recycled back into Kennecott's process water circuit for copper productions. As a result of these activities, the mass of selenium (contaminant of most concern) discharged to the Great Salt Lake was reduced from 6,055 pounds in 1999, to 2647 pounds in 2000 and 1228 pounds in 2001. Additional reductions in 2002 are also possible. Additional detailed information regarding these remediation projects can be found in the Record of Decision for the Kennecott North Zone Site and Kennecott South Zone Site dated September 26, 2002.

The Roundtable discussion provided us with a number of great ideas, several of which are still under consideration. However, we have not made a decision at this time as to the ultimate land use(s) for the Garfield wetland area. In the mean time, the site will be used for wetlands and wildlife. Over the next year, Kennecott will begin an ecological monitoring program for the wetland area in and around sites where remediation was performed to document the success of the removal and containment actions.

Kennecott will continue to keep you and other members of the public informed as activities progress in the future. For more information, please visit our website at www.kennecott.com. Specifically, please see our Community & Environmental Newsletter and our 2001 Social and Environment Report. Your continued interest in Kennecott's activities is appreciated.

Sincerely,

Paula Doughty

Paula H. Doughty, Manager
Environmental Affairs and Strategic Resources